

S 622-33 Chen-Northern, Inc.
L3bhmrp Bearcreek
1991 Highway Mine
Reclamation
Project, DSL/AMRB
90-001, T8S R21E
Sect. 6 SE1/4 NE1/4

FINAL REPORT

BEAR CREEK HIGHWAY MINE RECLAMATION PROJECT

DSL/AMRB 90-001

Bearcreek Area, Carbon County

South-Central Montana

T8S R21E Sec.6 SE NE SW

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FINAL REPORT

**BEARCREEK HIGHWAY MINE RECLAMATION PROJECT
DSL/AMRB 90-001**

**T8S R21E Sect. 6 SE1/4 NE1/4 SW1/4
Carbon County
South Central, Montana**

Prepared for:

Department of State Lands
Abandoned Mine Bureau

Prepared by:

Chen-Northern, Inc.
1610 B Street
Helena, MT 59604

March 1991



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1.0 INTRODUCTION

Funding for the reclamation, planning and administration of the Bearcreek Highway Mine Reclamation Project was provided through a grant from the U.S. Department of the Interior, Office of Surface Mining. The grant was administered by the Montana Department of State Lands, Abandoned Mine Reclamation Bureau.

1.1 MINING HISTORY

The first coal mined from the Red Lodge area was hauled to Billings for promotional purposes in 1882. Several years later when a Northern Pacific rail line was completed from Laurel to Red Lodge commercial mining got underway. The Bear Creek coal field was opened up when a branch rail line was built to Bridger in 1903 and then to Bearcreek in 1906. This set off a period of expanded coal development which peaked around the First World War, when the coal market was very strong. The mines in the Bear Creek area suffered from depressed conditions in the market in the 1920's and from increased competition from natural gas and hydroelectric power in the 1930's. Some of the mines experienced a substantial revival in the Second World War years. Mining on the Bear Creek side of the field suffered a heavy blow in 1953 when the Northern Pacific shut down its Bridger branch and the Montana Southern and Western railroads stopped serving the mines.

1.2 SITE LOCATION

The Bearcreek Highway reclamation site is an abandoned coal mine within the Red Lodge/Bear Creek coal field of south-central Montana. The site consists of one horizontal adit which underlies Montana Highway 308 and an associated subsidence feature upslope from the portal area. Several cultural and mine related features characterize the site including a small wooden structure, mining machinery, related debris and a visible coal seam.

The Bearcreek Highway is a fifteen-mile north/south road, between Red Lodge and Belfry, Montana, which bisects an area of extensive coal mining. Most of the countryside in the vicinity of the project site consists of hilly country with deep, narrow valleys between high,

irregular ridges and spurs. The area is drained primarily by Bear Creek which flows eastward until it joins the Clarks Fork at Belfry.

1.3 SITE LOCATION

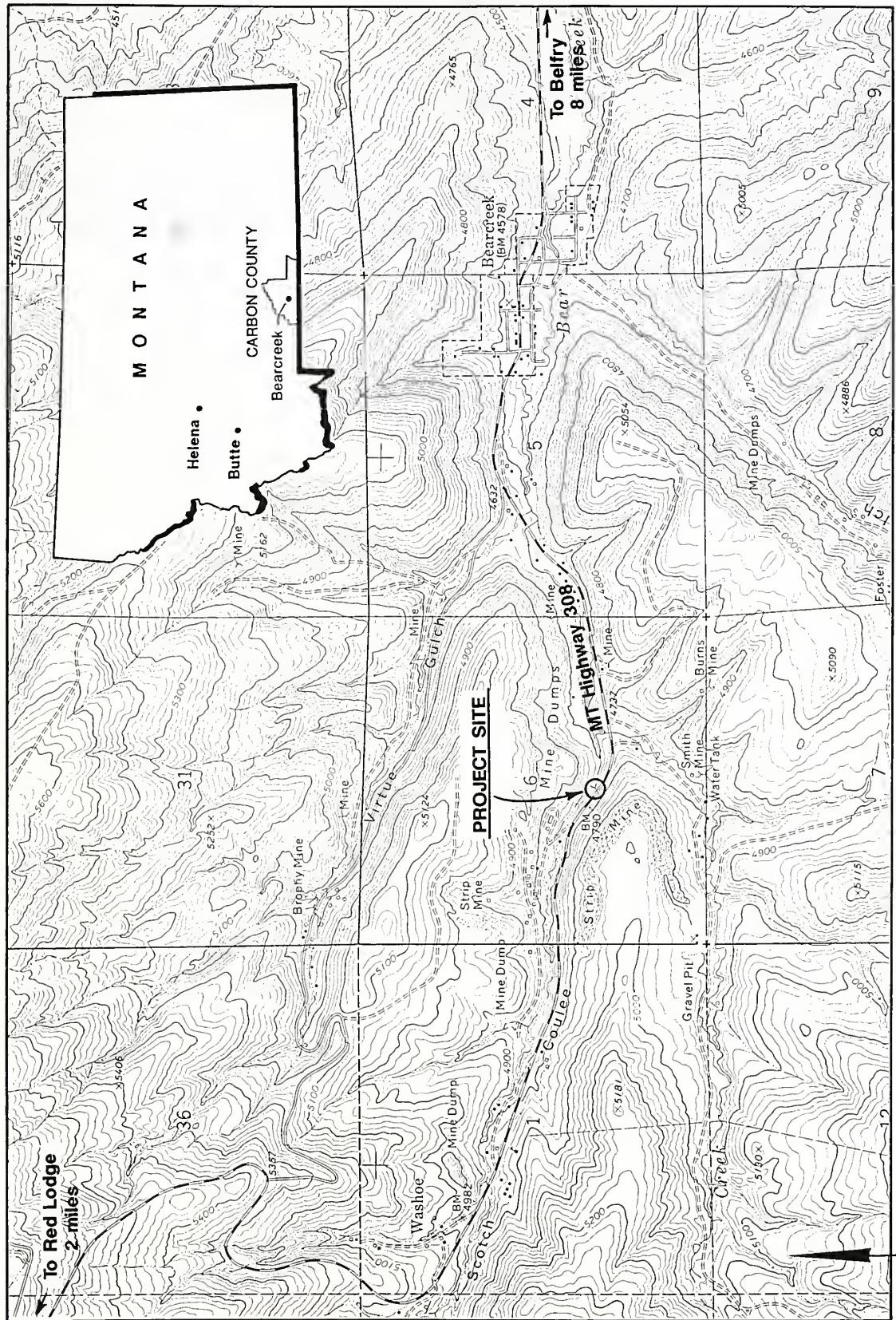
The Bearcreek Highway Mine Reclamation site is located approximately one mile west of Bearcreek, along the right-of-way of Highway 308. Figure 1-1 is a vicinity map showing the site location. The site location is further described as: SE 1/4, NE 1/4, SW 1/4, Section 6, Township 8 South, Range 21 East, Carbon County, Montana. The adit intersects Highway 308 approximately 27 feet west of Montana Highway Survey Station Marker 208 + 48 Ahead, 208 + 57 Back.

1.4 PROJECT OBJECTIVES

The Bearcreek Highway Mine Reclamation Project was designed and executed with the intent of eliminating a hazard to public health and safety associated with an abandoned coal mine adit. The adit undermined a public roadway, State Highway 308, for a length of approximately 100 feet. Due to the potential for surface subsidence and highway failure, a reclamation project was designed to remediate the hazards.

The goal of the project was to locate and backfill those portions of underground workings which were within the right-of-way of the public roadway and to reclaim the surface of lands disturbed by past mining activity. These goals were achieved through a geotechnical drilling program which determined the direction and extent of the mine void. Subsurface work also included stowing gravel and sand to stabilize the underground workings. The objective of surface revegetation efforts were to restore ground cover on disturbed areas without the propagation of noxious weeds. The subsidence feature, stockpile areas, and access routes were graded and revegetated with "weed free" seed and mulch.

Site Location Map
Bearcreek Highway Project
Carbon, County
FIGURE 1-1



2.0 RESPONSIBLE PARTIES

The following people/firms have contributed to the coordination, design, execution, and inspection of the Bearcreek Highway Mine Reclamation Project:

- ◆ PROJECT DESIGN AND ENGINEERING Chen-Northern, Inc.
1610 B Street
P.O. Box 4699
Helena, MT 59604
- ◆ CONTRACTOR McDaniel and Sons Contractors
P.O. Box 6716
Great Falls, MT 59406
- ◆ QUALITY CONTROL INSPECTION Hydrometrics, Inc.
5825 Lazy Lane
Billings, MT 59106
Project Inspector: Bill Wolff
Project Engineer: Ray Womack
- ◆ AMRB COORDINATION Chen-Northern, Inc.
600 South 25th Street
P.O. Box 30615
Billings, MT 59107
Project Inspector: Randy Kujat
- ◆ AMRB COORDINATION Susan McAnally
Department of State Lands
Abandoned Mine Reclamation
1625 11th Avenue
Helena, MT 59620

3.0 CHRONOLOGICAL LISTING OF EVENTS

The Bearcreek Highway Mine Reclamation Project was constructed during 1990. Site work commenced on May 29 and the reclamation work was substantially completed eleven days later, on June 8 1990. A stop work order was issued for approximately 150 days until revegetation could be performed in compliance with the specified seeding dates. The following section describes the sequence of events and milestones for the project.

3.1 PRE-BID CONFERENCE

The pre-bid conference was held April 20, 1990. The purpose of the meeting was to discuss the scope and goals of the project with prospective bidders, review the bid instructions, contract time and requirements, and present the engineers' cost estimate. The meeting was held at the project site which offered the contractors an opportunity to literally interpret the plans and request further explanation on items not fully understood.

3.2 PROJECT ADDENDUM

There were two addendum issued prior to bidding the Bearcreek Highway Mine Reclamation Project. Both addendum were required to clarify items of concern brought up by contractors during the pre-bid meeting. Appendix A contains copies of these documents.

Addendum No.1 was issued on April 24, 1990 and pertained to underground mine stowing. An alternate figure was issued to replace the Subsidence Backfill Detail included in the bid package. In addition, a paragraph of text describing site grading associated with backfilling the subsidence was included.

Addendum No. 2 was issued on April 26, 1990 and corrected specifications relative to "Borehole Drilling and/or Reaming". The required drill hole casing was identified in terms of material and thickness. Supplemental text was added regarding the construction of borehole covers for use on the paved roadway and shoulder. A figure was included detailing the plate cover for 16" diameter drill holes.

3.3 PROJECT BIDS

The Montana Department of State Lands, Abandoned Mine Reclamation Bureau publicly opened bids for the Bearcreek Highway Mine Reclamation Project (DSL/AMRB 90-001) on May 3, 1990. The three lowest bids are presented below. Complete bid tabulation results are included in Appendix B.

McDaniel and Sons Contractors, Great Falls, MT	\$28,465.40
Donnes Construction, Billings, MT	\$29,285.00
Stevens and Feller Contractors, Billings, MT	\$31,831.04

3.4 PROJECT CHRONOLOGY

The Bearcreek Highway Mine Reclamation Project was completed during May and June, 1990. The contract documents specified that seeding, fertilizing and mulching be performed after October 15, 1990. For this reason a work stoppage was issued June 9, 1990 when the project was substantially complete. Although the Contractor was given 60 days to complete the project, his on-site time totaled 11 days. The following chronology presents the sequence of events that lead to completion of the project.

CONTRACTOR	McDaniel & Sons Contractors
NOTICE OF AWARD	May 25, 1990
PRE-CONSTRUCTION MEETING	May 25, 1990
NOTICE TO PROCEED	May 29, 1990
CONSTRUCTION START-UP	May 29, 1990
SUBSTANTIAL COMPLETION	June 9, 1990
SEEDING COMPLETED	October 25, 1990
FINAL ACCEPTANCE	October 25, 1990

4.0 PROJECT CONSTRUCTION

4.1 DESCRIPTION OF PROJECT PLAN

The Bearcreek Highway Mine Reclamation Project was designed and implemented with the intent of eliminating the potential for subsidence on State Highway 308 associated with the underlying coal mine adit. Preliminary site investigation in 1987 involved subsurface exploratory drilling to locate the size and direction of the underlying mine void. Two bore holes were drilled on the southern shoulder of State Highway 308. One borehole located a mine void at approximately 66 feet below ground surface. The area of the void was estimated as 8 feet in height and 10 feet in width.

Additional drilling was performed during the construction project to further delineate the underground mine working. Eight inch diameter boreholes were drilled vertically with a center to center spacing of 15 feet. Boreholes which encountered the mine void were reamed to a larger diameter and utilized to stow sand and gravel materials underground.

4.2 CONTRACTOR'S OPERATION

The project was performed utilizing a crew of three to seven people. Rick McDaniel was supervisor during the project and his crew consisted of Roland Pandis, truck operator; Larry Nicola, flagperson; Sandy Strobbe, flagperson; Shelby Stone, flagperson; a backhoe operator and a two person drill crew. The drilling subcontractor was Rock Creek Drilling of Joliet, Montana.

The following list identifies the major equipment used by McDaniel and Sons Contractors to complete the Bearcreek Highway Mine Reclamation Project.

- Mack 6000 Dump Truck
- 2 Peterbuilt Tractors with Belly Dump Trailers
- Terex 72-40 Wheel Loader
- Bantam C-451 Backhoe
- Drilltech D 40 K Drill Rig
- Hydromulcher
- Stowage Hopper

The Bantam C-451 backhoe was utilized for topsoil removal and replacement, and constructing the access route. The Mack 6000 dump truck transported approximately 50 cubic yards of fill from a borrow area to the adit subsidence. The backhoe distributed and compacted the fill utilizing the bucket. The site was cleaned and leveled using the Euclid 7240 wheel loader. Tackifier was applied using a hydraulic mulcher.

4.3 PROJECT CHANGE ORDERS

Two change orders were issued on the Bearcreek Highway Mine Reclamation Project for a net change in contract price of \$8,036.74 or 28.2% of the contract total. The purpose of the change orders were to modify project designs, revise construction methods and adjust compensation for additional work not foreseen in the original project plan. Table 4-1 summarizes the dollar amounts and dates of the change orders. Appendix C contains copies of the executed change order documents.

Change Order No. 1 included an agreement to allow change orders to be written if an increase or decrease occurred of more than 25 percent of the total cost of the work from the original contract quantities. Items listed, as requested by the contractor, included project permanent signs, extended working hours, borehole cover design, and placement of gravel in Borehole BH-1C to help confine subsequent sand stowage. These items were discussed during the preconstruction meeting. No additional compensation was received for Change Order No. 1.

Change Order No. 2 included the drilling of four additional boreholes above the estimated six in the plans and specifications, and the accompanying increase in stowage and concrete materials. Sand stowage material was ordered according to anticipated quantities needed to avoid work delays. One load (18 cy) of sand was turned away at the end of the borehole drilling at a cost of \$150.00 and is included on Change Order No. 2.

TABLE 4-1
CHANGE ORDER SUMMARY

CHANGE ORDER	AMOUNT	DATE
Change Order No. 1	\$ 0.00	May 20, 1990
Change Order No. 2	\$ 8,036.74	July 9, 1990

4.4 CONSTRUCTION ACTIVITIES/QUANTITIES USED

Table 4-2 summarizes the construction activities and quantities used on the Bearcreek Highway Mine Reclamation Project. In addition to the quantities listed the Contractor applied an unspecified quantity of soil tackifier, 27 pounds of grass seed, 91 pounds of fertilizer, and 800 pounds of wood fiber mulch.

TABLE 4-2
MATERIAL QUANTITY SUMMARY

BOREHOLE OR AREA	DEPTH DRILLED	GRAVEL (CY)	SAND (CY)	CONCRETE (CY)	BACKFILL (CY)	REMARKS
BH-8	71'	—	—	1.2	—	No void encountered
BH-1B	71'	—	—	1.2	—	No void encountered
BH-1C	59'	47.1	—	2.0	—	
BH-2	59'	11.9	12.8	2.0	—	
BH-3	59'	—	62.8	2.5	—	Drilled at 8° angle, offset 7' SE of adit
BH-4	63'	—	61.7	2.0	—	
BH-5	59'	—	53.2	2.0	—	
BH-6	65'	—	49.0	1.7	—	
BH-8	65'	—	42.6	1.1	—	
BH-8	65'	—	56.4	1.3	—	
Adit Subsidence	—	—	—	—	48.0	
TOTAL	636'	59.0	338.5	17.0	48.0	

5.0 PROJECT COSTS

5.1 PAYMENT REQUESTS

The total contract amount of the Bearcreek Highway Mine Reclamation Project was \$36,137.11 compared to the grant budget estimate of \$44,505.00. Table 5-1 presents a summary of the approved payment requests issued for the Project. Appendix D contains copies of these documents, the Schedule of Values for Contract Payment, and the Affidavit on Behalf of Contractor.

TABLE 5-1 PAYMENT REQUEST SUMMARY		
PAYMENT REQUEST	AMOUNT	DATE
Payment Request No. 1	\$ 34,184.46	June 29, 1990
Final Payment Request	\$ 2,317.68	December 6, 1990
Total Contract Amount	\$ 36,502.14	

5.2 COST SUMMARY

Table 5-2 presents an itemization of quantities and costs for the Bearcreek Highway Mine Reclamation Project. All work items are included as per the estimated plan quantities. The total units of work completed on the project are listed and a percentage analysis has been computed based on estimated vs. actual quantities.

TABLE 5-2
ITEMIZATION OF QUANTITIES AND COSTS

Item No.	Description	Estimated Plan Quantity	Unit Bid Price	Change Order No. 2	Total Units of Work Completed	Total Cost of Completed Work	Percent of Quantities Estimated
1	Traffic Control	1 LS	9,104.00	--	1.00	9,014.00	100.00
2	Borehole Drilling/Reaming	380 LF	21.13	256.00	636.00	13,438.68	167.37
3	Underground Mine Stowing	275 CY	21.32	122.52	397.52	8,475.13	144.55
4	Backfill Boreholes Concrete/Grout	19 CY	67.00	(2.01)	16.99	1,138.33	89.42
5	Backfill Boreholes; Aggregate Base & Asphaltic Concrete	2 CY	100	--	2.00	294.00	100.00
6	Subsidence Backfill	1 LS	2,955.00	--	1.00	2,955.00	100.00
7	Fertilize, Seed & Mulch	1 LS	1,037.00	--	1.00	1,037.00	100.00
8	Additional Cost For Unused Stowage: 18.05 CY @ \$8.31/CY	--	--	1.00	1.00	150.00	--
TOTAL						\$ 36,502.14	128.23 %

5.3 AVERAGE COSTS

The work items performed during the Bearcreek Highway Mine Reclamation Project have been compiled in Table 5-3. An average cost per lineal foot of borehole has been derived including costs for underground mine stowing and traffic control. In addition, surface reclamation costs have been calculated based on the project costs for subsidence backfill and revegetation of .34 acres.

TABLE 5-3
AVERAGE RECLAMATION COSTS

WORK ITEM	QUANTITY	COST	AVERAGE COSTS
Borehole Drilling/Reaming	636 LF	\$ 13,438.68	\$ 21.13/LF
Underground Mine Stowing	160 LF	\$ 8,475.13	\$ 5,297.00/LF
Backfill Boreholes Concrete/Grout	554 LF	\$ 1,138.33	\$ 2.05/LF
Backfill Boreholes Aggregate Base & Asphaltic Concrete	2 LF	\$ 294.00	\$ 147.00/LF
Traffic Control	8 days	\$ 9,014.00	\$ 1,126.75/day
TOTAL BOREHOLE COST	636 LF	\$ 32,360.14	\$ 50.88/LF
Subsidence - Backfill	48 CY	\$ 2,955.00	\$ 61.56/CY
Seed, Fertilize and Mulch	0.34 acre	\$ 1,037.00	\$ 3,050.00/acre
SURFACE RECLAMATION COSTS		\$3,992.00	

5.4 PROFESSIONAL SERVICE FEES

Consultant services for design and implementation of the Bearcreek Highway Mine Reclamation Project were provided by both Chen-Northern and Hydrometrics. Table 5-4 presents an analysis of these fees in relation to the Total Project Cost. The preliminary site investigation phase of the project was performed by Chen-Northern during 1987 and involved the initial geotechnical evaluation of the site. The cost of these services have been combined with the other design services which include preparation of the grant narrative for project funding, design and engineering activities and construction bid package preparation. In 1990, the project was bid and Hydrometrics was assigned the task of construction contract administration, quantity accounting and full-time resident inspection. The project was substantially completed in June, 1990 after which Chen-Northern was transferred the responsibility of completing the project. This task involved oversight of revegetation efforts and preparation of the final report.

TABLE 5-4
ANALYSIS OF PROFESSIONAL SERVICE FEES
BEAR CREEK HIGHWAY RECLAMATION PROJECT

CHEN-NORTHERN - DESIGN AND ENGINEERING COSTS	\$ 4,823.44
Preliminary Investigation, Grant Narrative, Engineering and Bid Documents	
HYDROMETRICS - INSPECTION COSTS	\$ 6,585.88
Construction Administration and Inspection	
CHEN-NORTHERN - INSPECTION COSTS	\$ 3,165.55
Construction Administration and Inspection (Revegetation & Maintenance), Final Report Preparation	
TOTAL INSPECTION COSTS	\$9,751.43
TOTAL CONSULTANT COSTS	\$14,574.87
CONTRACTORS CONSTRUCTION COSTS	<u>\$ 36,502.14</u>
TOTAL COST BEAR CREEK HIGHWAY RECLAMATION PROJECT	\$51,077.01

PERCENTAGE ANALYSIS

Design and Engineering Costs/Total Construction Cost	13.2%
Total Inspection Costs/Total Construction Cost	26.7%
Total Consultant Costs/Total Construction Cost	39.9%

6.0 PROJECT SUMMARY

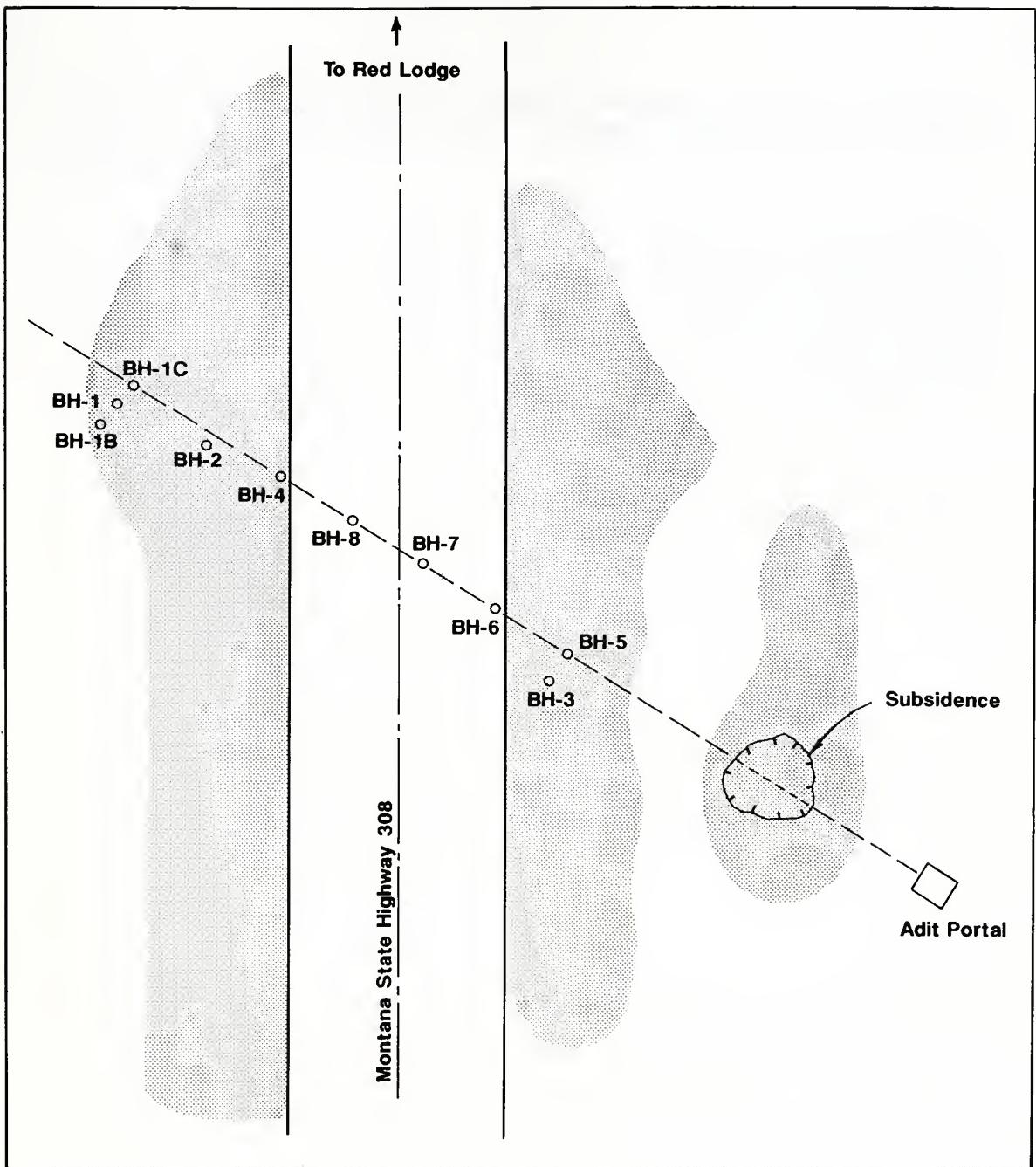
The major work items performed during the Bearcreek Highway Mine Reclamation Project included: backfilling the subsidence; backfilling, by underground mine stowing methods, approximately 80 lineal feet of the adit where it passed beneath Highway 308; and revegetating backfilled and disturbed areas; and repair of pavement damage.

6.1 CONSTRUCTION SUMMARY

The Bearcreek Highway Mine Reclamation Project involved geotechnical drilling to determine the direction and extent of the mine void underlying Highway 308. A total of ten boreholes were drilled during the construction phase of the project. Nine holes were drilled vertically and one (BH-3) was drilled at a 25 degree angle from the edge of the pavement to intercept the working at an incline. Eight boreholes encountered the mine void and were reamed to 16-inch diameter for underground stowing. Two of these boreholes were above the six estimated and were necessary to obtain the specified 15-foot spacing. Two 8-inch diameter holes (BH-1 and BH-1B) did not encounter the void. Figure 6-1 presents the borehole configuration with respect to Highway 308.

Three inch minus gravel was selected to be placed in the furthest downgradient borehole to the south (BH-1C) in an attempt to reduce the tendency of the sand to migrate out of the backfill area. Left over gravel was placed in the next hole to the north (BH-2), and clean sand was placed in the remaining boreholes. The backfill was placed until the boreholes were filled to 10 feet above the adit roof. The backfill was periodically monitored during and after placement for additional subsidence. When no additional subsidence was observed, concrete was placed to the surface or the base of the road aggregate. Open boreholes in the pavement area were covered with a 1/2 inch thick steel plate between backfilling operations and completion. Aggregate and asphalt were placed over boreholes in the road area.

The subsidence feature upslope from the portal was not directly accessible from the pavement and material for backfill was not available adjacent to the opening. To accomplish the proposed reclamation, development of an access route between the borrow area and subsidence was required. Topsoil was initially removed and stockpiled. When



██████████ Disturbed Area

NTS

Borehole Configuration
Bearcreek Highway Project
Carbon, County
FIGURE 6-1

backfilling activities were completed the disturbed areas were prepared for revegetation. Tackifier was applied for erosion control until seeding could be accomplished several months later.

Revegetation activities resumed on October 25, 1990 to comply with the specified seeding dates (October 15 through April 30). Disturbed areas were seeded (80 lbs/acre) and fertilized (270 lbs/acre) by broadcasting and hand raking. Wood fiber mulch was applied using a hydraulic mulcher at a rate of 2300 lbs/acre. The total approximate area reclaimed including the area disturbed for equipment access and stockpiling stowing materials was 15,000 square feet, extending on right-of-ways north and south of Highway 308.

The Contractor was reported as being diligent and helpful, and the project was completed as specified. Work methods and procedures were efficient and completed expediently which contributed to a minimum of traffic delays.

6.2 SITE CONDITIONS AFTER COMPLETION

The asphalt patches over three boreholes on State Highway 308 required maintenance within three months of their original placement. Minor subsidence consisting of two to three inch depressions had deteriorated the road surface. The maintenance work involved repairing the asphalt patches and was performed when the Contractor returned to the site in October of 1990 to accomplish the seeding.

6.3 MONITORING

Periodic monitoring of the project site should be conducted for possible additional subsidence of the asphalt patches on the highway. Revegetation efforts should be monitored over several years after construction to ensure successful vegetative cover has been established. The results of vegetation inspections on reclaimed sites will provide data on species which can successfully revegetate mined areas.

7.0 COMMENTS AND SUGGESTIONS

The Bearcreek Highway Mine Reclamation Project was a cooperative effort between McDaniel and Sons Contractors, the drilling subcontractor (Rock Creek Drilling), Hydrometrics, Chen-Northern, and the Department of State Lands, Abandoned Mine Reclamation Bureau. The construction phase of the project was completed expediently and as specified. Consultant services could have been coordinated differently to have provided the AMRB a more efficiently managed project.

The administration costs (presented in Table 5-4) reflect the increased expense of having different engineering firms involved in the design and construction phases of the project. The transfer of construction oversight responsibilities from one firm to another, before completion of the project, also increased management activities. It is preferable that for future projects the design engineer and construction engineer be the same firm from the conception of the project, to its final completion.

8.0 SLIDES

Before, during, and after slides and photographs were taken of the reclamation construction project. Table 8-1 presents a log describing each slide and photograph taken. The project slides and photos are contained in Appendix E.

TABLE 8-1
CONSTRUCTION SLIDE AND PHOTO LOG

SLIDE #	DATE	DESCRIPTION
1	5-30-90	Pre-construction and pre-drilling
2	5-30-90	Subsidence area
3	5-30-90	Drilling rig over BH-2
3	5-30-90	Drilling BH-2
5	5-30-90	Drilling BH-2
6	5-30-90	Clearing borrow area for sand stockpile
7	5-30-90	C-451 removing topsoil for haul road
3	5-30-90	C-451 removing topsoil for haul road
3	5-30-90	Leveling pad for drill rig
10	5-30-90	Reaming BH-1
19	5-31-90	Drilling BH-1
12	5-31-90	Setting hopper over BH-1C
18	5-31-90	Gravel to BH-1C
14	5-31-90	Gravel to BH-1C
15	5-31-90	Drill rig at 8 degrees over BH-3
16	5-31-90	Overall showing BH-1C to BH-3
14	6-1-90	Alignment of BH-3 to BH-1C
18	6-1-90	Alignment of BH-3 to BH-1C
19	6-1-90	Drilling rig setting up over BH-4
20	6-1-90	Sand to BH-4

TABLE 8-1
CONSTRUCTION SLIDE AND PHOTO LOG

SLIDE #	DATE	DESCRIPTION
21	6-1-90	Cement to BH-2
22	6-1-90	Drilling BH-5
23	6-4-90	Drilling BH-8
24	6-4-90	Drilling BH-7
25	6-4-90	Drilling BH-7
26	6-5-90	C-471 removing topsoil for ramp to subsidence
27	6-5-90	Removing topsoil around subsidence
28	6-5-90	Mack 6000 dump borrow to stockpile area
29	6-5-90	Subsidence backfill
30	6-6-90	Drilling BH-6
40	6-6-90	Concrete to BH-5
32	6-6-90	Regrade haul road
33	6-6-90	Regrade borrow area
34	6-6-90	Borrow area regrade
35	6-6-90	Concrete to BH-6
36	6-6-90	Gravel to BH-7
40	6-7-90	Concrete to BH-7
38	6-7-90	Gravel to BH-8
39	6-7-90	Asphalt to BH-8
40	6-7-90	BH-6, BH-7 & BH-8 complete
39	6-8-90	Overall, man standing on BH-7
42	6-8-90	Overall, man standing on BH-6
43	6-8-90	Overall, man standing on BH-1C
44	6-8-90	Overall, man standing on BH-3
45	6-8-90	Overall, man standing on BH-5

TABLE 8-1
CONSTRUCTION SLIDE AND PHOTO LOG

SLIDE #	DATE	DESCRIPTION
46	6-8-90	Overall, man standing on BH-4
47	6-8-90	Overall, man standing on BH-4
46	6-8-90	Overall, man standing on BH-2
49	6-8-90	Post construction, subsidence
58	6-9-90	Post construction, above subsidence
51	6-9-90	Post construction, haul road
52	6-9-90	Spraying tackifier
53	6-9-90	Spraying tackifier
54	6-9-90	Spraying tackifier
55	6-9-90	Spraying tackifier
56	6-9-90	Washing highway
57	6-9-90	Washing highway
58	10-25-90	Subsidence of asphalt patches, NE view
51	10-25-90	Subsidence of asphalt patches, SW view
60	10-25-90	Seed and fertilizer applied, S side of highway
46	10-25-90	Seed and fertilizer applied, S side of highway
62	10-25-90	Seed and fertilizer applied, N side of highway
53	10-25-90	Seed and fertilizer applied, N side of highway
60	10-25-90	Mulch applied, S side of highway
65	10-25-90	Mulch applied, N side of highway
66	10-25-90	Mulch applied, N side of highway
67	10-25-90	Maintenance of subsided borehole patches

APPENDIX A

PROJECT ADDENDUM

127P

DEPARTMENT OF STATE LANDS



STAN STEPHENS, GOVERNOR

CAPITOL STATION

STATE OF MONTANA

(406) 444-2074

April 24, 1990

1625 ELEVENTH AVENUE
HELENA, MONTANA 59620

State of Montana
Invitation for Bid
DSL-AMRB-90-001
To be Opened: 05/03/90
for
BEARCREEK HIGHWAY PROJECT
CARBON COUNTY, MONTANA

ADDENDUM NO. 1

TO ALL PLANHOLDERS

The following corrections and/or alterations to the plans and specifications for this project are as much a part and parcel of said plans and specifications as if included therein.

1. Section 4.29 (c) "Underground Mine Stowing," Adit Segment Beneath Highway 308 Backfill Detail (Figure 4.2). The attached figure 4.2 will be added as page 18-26. Standard Drawing No. 4.02 Subsidence Backfill Detail will be deleted from this section.
2. Section 4.29 (f), "Subsidence Backfill," Page 21-26 - the following paragraph will be added:

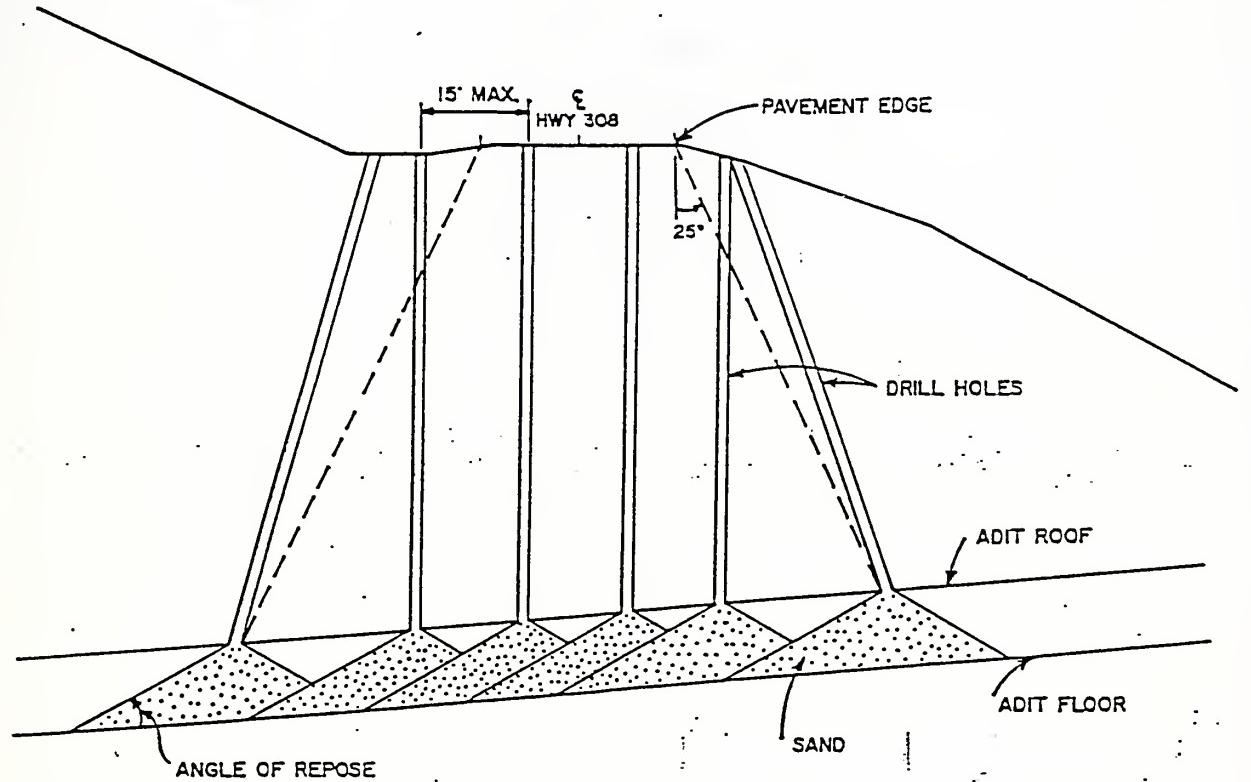
Site grading associated with backfilling the designated subsidence includes grading the steep slope between the subsidence and the wooden structure illustrated on Figure 4.1. The maximum slope gradient in this area shall be 1.5:1 and the graded slope shall blend with adjacent contours. Care must be taken to avoid disturbing the wooden structure, and soils are not to be placed against the wooden structure during or as a result of site grading operations.

All other terms and conditions of award including the bid opening date of 2:00 p.m., Thursday, May 3, 1990 remain as previously issued.

Sincerely,

A handwritten signature in black ink, appearing to read "Larry Marshall".

Larry Marshall, Chief
Abandoned Mine Reclamation Bureau
Reclamation Division
SM/cf



Northern
Engineering
and Testing, Inc.

STATE OF MONTANA
DEPARTMENT OF STATE LANDS
ADIT SEGMENT BENEATH
HIGHWAY 308 BACKFILL DETAIL

Figure 4.2

April 26, 1990

State of Montana
Invitation for Bid
DSL-AMRB-90-001
To be Opened: 05/03/90
for
BEARCREEK HIGHWAY PROJECT
CARBON COUNTY, MONTANA

ADDENDUM NO. 2

TO ALL PLANHOLDERS

The following corrections and/or alterations to the plans and specifications for this project are as much a part and parcel of said plans and specifications as if included therein.

- 1) SECTION 4.29(b) - Borehole Drilling and/or Reaming". Paragraph No. 4 which reads:

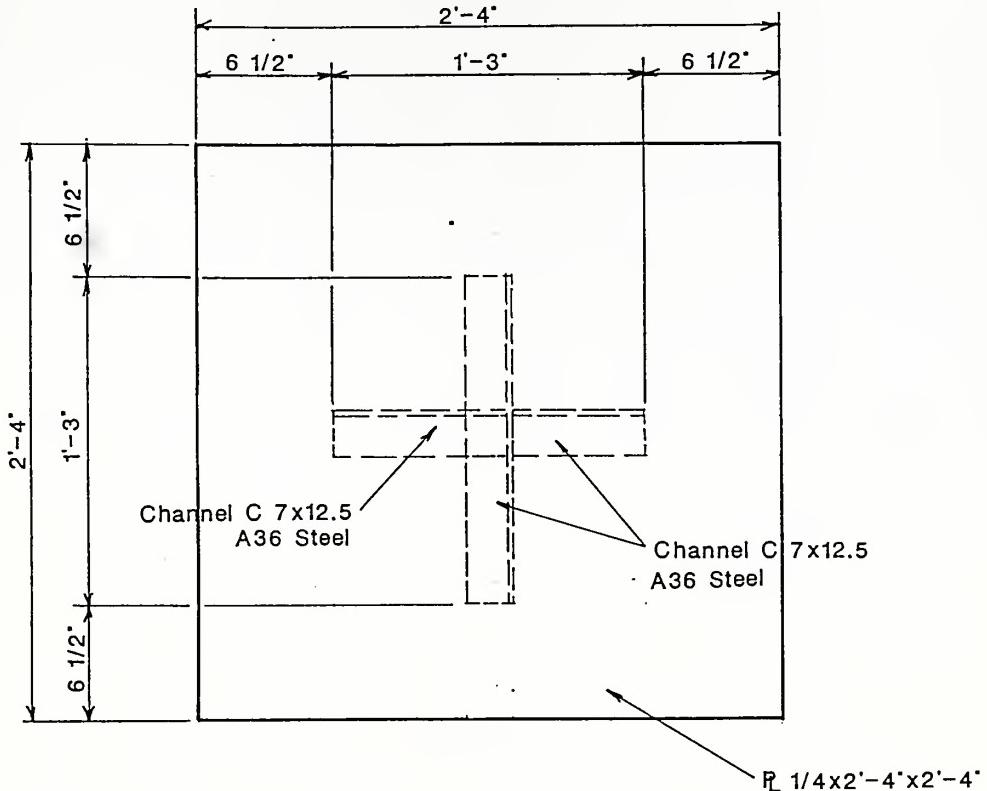
The Contractor will place a minimum 10 feet of temporary casing in the holes. Casings are to be removed prior to borehole filling.

shall be changed to read as follows:

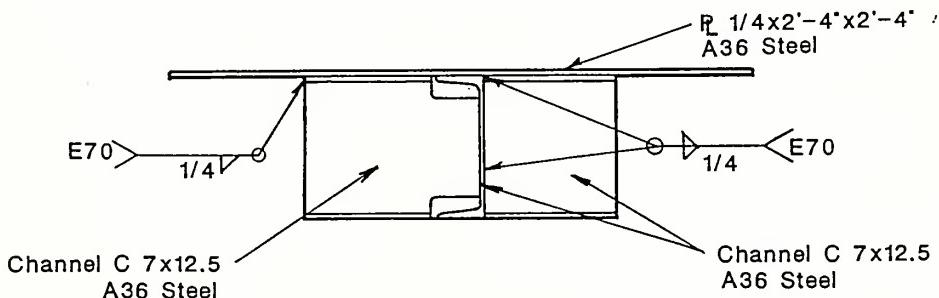
The Contractor will place a minimum of 10 feet of temporary casing in the holes. Casings are to be removed prior to borehole filling. Casing shall be steel and shall have a minimum wall thickness of 0.064 inch.

- 2) SECTION 4.29(b) - "Borehole Drilling and/or Reaming", add the following paragraph:

For boreholes drilled in either the paved roadway or the graveled shoulder, the borehole cover shall be constructed of mild steel plate and conform to the attached Figure 4.03. The attached Figure 4.03 shall be added as page 18a - 26.



PLAN



PROFILE

Not To Scale

Hydrometrics, Inc.
Consulting Scientists & Engineers
Helena, Montana

Plan and Profile of Plate Cover
for 16" dia. Drill Holes

APPENDIX B

BID TABULATIONS

**BEAR CREEK HIGHWAY
CARBON COUNTY, MONTANA**

DSL/AMRB 90-001
May 3, 1990

BID TABULATIONS						Shumaker Trucking PO Box 1442 Great Falls, MT 59403
Item Number	Estimated Quantity	Unit	Description:	Unit Price	Total Price	Stevens & Feller Box 204 Billings, MT 59103
1.	1	LS	Traffic Control	XXX	\$9,014.00	McDaniel & Sims PO Box 6716 Great Falls, MT 59406
2.	380	LF	Borehole Drilling and/or Reaming	21.13	8,029.40	Donnes Construction 4002 McGill Road Billings, MT 59101
3.	275	CY	Underground Mine Stowing	21.32	5,863.00	
4.	19	CY	Backfill Boreholes Concrete/GROUT	67.00	1,273.00	
2.	CY		Backfill Boreholes Aggregate Base and Asphaltic Concrete	147.00	294.00	100.00
5.	1	LS	Subsidence Backfill	XXX	2,955.00	1,000.00
6.	1	LS	Fertilize, Seed, and Mulch	XXX	1,037.00	500.00
			TOTALS		\$28,465.40	\$31,831.04
						\$34,833.00

APPENDIX C

CHANGE ORDERS

Huane
A/C

JUN 12 1990

SECTION II

2.12 CHANGE ORDER

STATEMENT

Order No. 1

Date: May 20, 1990

Agreement Date: May 25, 1990

NAME OF PROJECT: Bearcreek Highway

Carbon Co., Montana

OWNER: Montana Dept. of State Lands

CONTRACTOR: McDaniel & Sons Contractors

Change Orders must be accompanied by an itemized cost breakdown. You are hereby requested to comply with the following changes from the Contract Documents. (Show separate costs for materials, labor, equipment, and miscellaneous. Show percent where applicable.)

ITEM NO.	DESCRIPTION OF CHANGES - ESTIMATED QUANTITIES & UNITS	COST OF CHANGES					TOTAL COST
		MATERIALS	LABOR	EQUIPMENT	MISCELLANEOUS	TOTAL UNIT COST	
	See attached narrative.						

TOTAL COST - MATERIALS, LABOR, EQUIPMENT & MISCELLANEOUS

No change

OVERHEAD & PROFIT @ %

GRAND TOTAL - THIS CHANGE ORDER

Original Contract Price \$28,465.40

Current Contract Price Adjusted by Previous Order 28,465.40

Cost This Change Order (+ or -) -

New Contract Price Including This Change Order 28,465.40



SECTION

SECTION II

The completion date as set forth in the Contract Documents shall be
(unchanged), increased, decrease) by 0 calendar days.

The date for completion of all work will be July 30, 1990.

Description and Justification for Change:

1. See narrative for work directive no. 1.

SURETY CONSENT

The Surety hereby consents to the aforementioned Contract Change Order and agrees that its bond or bonds shall apply and extend to the Contract as thereby modified or amended per this Change Order. The Principal and the Surety further agrees that on or after execution of this consent, the penalty of the applicable Performance Bond or Bonds is hereby increased by (\$ _____)

(100% of the Change Order amount) and the penalty of the application Payment Bond or Bonds is hereby increased by (\$ _____) (100% of the Change Order amount):

COUNTERSIGNED BY MONTANA
RESIDENT AGENT

SURETY

By: _____
(Seal)

Recommended by: J. H. D. B. S., Engineer

Accepted by: Frank Marshall, Contractor

Approved by: J. H. D. B. S. Terry Marshall, Owner

CHANGE ORDER NO. 1
NARRATIVE

- Road construction signs may be placed on posts driven into the ground, and may be left in place and visible for the duration for the construction period.
- Borehole covers in paved areas shall be constructed as follows: the top plate shall be approximately 30" X 30". A centering guide the same diameter as the borehole and at least 7.5" long shall be attached. Cover shall be made of approximately 0.5" thick steel. The road surface shall be recessed to accommodate the top plate and prevent a projected edge.
- In order to reduce the tendency of the stowed backfill sand to migrate out of the backfill area, the backfill in the borehole farthest to the south shall be gravel with the following gradation, or meeting the approval of the engineer:

<u>Screen or sieve size</u>	<u>Percent passing</u>
3"	80-100
1.5"	60-95
0.75"	30-80
0.125"	10-60
No. 4	0-40
No. 8	0-15
No. 16	0

- The contractor is authorized to work 12 hour days. Normal working hours may be 7 AM to 7 PM, Monday through Saturday at the engineer's discretion.
- Either party to the contract may demand in writing that a supplemental agreement or change order be prepared for an adjustment in the basis of payment, or they may agree that payment be made at unit prices or agreed prices, as documented and authorized by change order, if an increase or decrease occurs of more than 25 percent of the total cost of the work calculated from the original contract quantities at the unit contract prices. An adjustment in payment for a quantity increase shall apply only to those quantities greater than the initial 25 percent increase. An adjustment in payment for quantity decrease shall apply to the quantity of work actually performed. In the case of decreased quantities of work, no allowance will be made in the supplemental agreement or change order for anticipated profits.

The supplemental agreement or change order will describe the extra or additional work completely, will state the agreed prices at which the completed work will be paid, and will include the approximate quantities of work as estimated prior to performance of the work. The supplemental agreement or change order shall be executed by both parties to the original contract and shall become a part of the original contract. Payment for the work included under the terms of the

supplemental agreement or change order will be made at the prices set forth therein and for the actual quantity of work performed.

The contractor shall either submit written evidence or deposit a surety bond with the Department of State Lands that fully covers the amount of all work involved in an increase contemplated by the supplemental agreement or change order.

If a supplemental agreement or a change order utilizing contract unit prices or agreed prices cannot be agreed upon, the work in dispute may be canceled from the contract or it may be ordered to be performed on a force account basis. If the force account method of payment is unacceptable to either party, an alternate method of payment shall be agreed upon before work is started on that portion of the work or on the contract item concerned in excess of the 25 percent increase or decrease. The alternate method payment shall take into account a redistribution of fixed overhead costs and shall apply only to those contract item quantities or work in excess of the 25 percent increase or decrease.

SECTION II

2.12 CHANGE ORDER

Order No. 2Date: July 9, 1990

Agreement Date: _____

NAME OF PROJECT: Bearcreek HighwayCarbon County, MontanaOWNER: Montana Department of State LandsCONTRACTOR: Mcdaniel and Sons Contractors

Change Orders must be accompanied by an itemized cost breakdown. You are hereby requested to comply with the following changes from the Contract Documents.
 (Show separate costs for materials, labor, equipment, and miscellaneous. Show percent where applicable.)

ITEM NO.	DESCRIPTION OF CHANGES - ESTIMATED QUANTITIES & UNITS	COST OF CHANGES				TOTAL COST
		MAT'L'S.	LABOR	EQUIP.	MISC.	
02	Drilling/reaming 256 LF				21.13	5409.28
03	Stowing - 122.52 CY				21.32	2612.13
04	Borehole Concrete < 2.01 CY >				67.00	<134.67>
07	Unused Stowage - 18.05 CY				8.31	150.00
TOTAL COST - MAT'L'S., LABOR, EQUIPMENT & MISC. _____						
OVERHEAD & PROFIT @ _____ %						
GRAND TOTAL - THIS CHANGE ORDER <u>\$ 8,036.74</u>						

Original Contract Price	<u>\$28,465.40</u>
Current Contract Price Adjusted by Previous Change Order	<u>\$28,465.40</u>
Cost this Change Order (+ or -)	<u>\$ 8,036.74</u>
New Contract Price Including this Change Order	<u>\$36,502.14</u>

2.12, continued

The completion date as set forth in the Contract Documents shall be (unchanged, increased, decreased) by 0 calendar days.

The date for completion of all work will be remain unchanged.

Description and Justification for Change:

1. See attached narrative.

SURETY CONSENT

The surety hereby consents to the aforementioned Contract Change Order and agrees that its bond or bonds shall apply and extend to the Contract as thereby modified or amended per this Change Order. The principal and the Surety further agree that on or after execution of this consent, the penalty of the applicable Performance Bond or Bonds is hereby increased by: Eight Thousand Thirty-Six and 74/100 Dollars.

(\\$ 8036.74) (One hundred percent (100%) of the Change Order amount) and the penalty of the applicable Payment Bond or Bonds is hereby increased by Eight Thousand Thirty-six and 74/100 Dollars

(\\$ 8036.74) (One hundred percent (100%) of the Change Order amount).

COUNTERSIGNED BY MONTANA RESIDENT AGENT SURETY

BY: _____

Recommended by: M. F. D. Bear, Engineer

Accepted by: Donald M. M., Contractor

Approved by: Terry Marshall, Owner

CHANGE ORDER NO. 2

NARRATIVE

The purpose of this change order is to accommodate additional site work, consisting of the following:

- Additional drilling was required totalling 256 linear feet. The plans and specifications estimated 6 holes would be required. Two holes had to be redrilled because they did not encounter the void, and two new holes (10 holes total) were required to obtain the specified 15 feet spacing between holes. The original borehole spacing was based on an alignment at right angles to the highway when, in actuality, the workings ran at an angle.
- Stowed materials amounted to 397.52 cubic yards. The original estimate was 275 CY; therefore, an increase of 122.52 CY was required.
- Backfilling of boreholes with concrete required 16.99 CY, a decrease of 2.01 CY from the original estimate of 19 CY.
- During the course of stowing the final borehole, the contractor brought 18.05 CY of stowage material to the site which he was unable to use because the hole filled up while the material was in transit. It was recommended that the contractor be reimbursed \$150 for the cost of hauling the unused material.

APPENDIX D

**APPROVED PAYMENT REQUESTS,
SCHEDULE OF VALUES FOR CONTRACT PAYMENT AND
AFFIDAVIT ON BEHALF OF CONTRACTOR**

C/N

RECEIVED

JUN 28 1990

PAYMENT REQUEST NO. 1

From: May 30, 1990
 Project Name: Bearcreek Hwy. Project

To: June 21, 1990
 Owner: Montana Department of State Lands
 Abandoned Mine Bureau
 1625 Eleventh Avenue
 Address: Helena, MT 59620

Location: Carbon County, Montana
 Name of Contractor: McDaniel & Sons Contractors

STATE LANDS



Summary Of Project Status

Amount of Original Contract	\$28,465.40
Amount of Approved Change Order(s)	0.00
TOTAL CONTRACT AMOUNT	28,465.40

Contract Time Used to Date *10 22 Days 2m*

Percentage of Contract Time Used	37 %
Percentage of Contract Amount Earned	126.4 %

Original Contract Amount Completed \$35,983.64

Change Order(s) Amount Completed 0.00

Amount for Materials On Site 0.00

TOTAL To Date 35,983.64

Times 90% (if amount earned <50% Contract Amount)

Times 95% (if amount earned >50% Contract Amount) 95% 34,184.46

TOTAL AMOUNT Earned To Date 34,184.46

Less Previous Amount Earned 0.00

Amount Payable This Period 34,184.46

Less 1% Gross Receipts Tax (Owner sends to State) 341.84

TOTAL DUE CONTRACTOR THIS PERIOD 33,842.61

Requested By: McDaniel & Sons Contractors *John McDaniel* Date: 6/27/90
 (Contractor)

Checked By: Hydrometrics, Inc. *M. J. D. Baier* Date: 6/26/90
 (Engineer)

Approved By: Susan McAnally, AMR Bureau *Susan McAnally* Date: 6/29/90
 (Owner)

900040-1

PAYMENT REQUEST NO. 1

Project: Bearcreek Hwy. Project

ITEM NO.	DESCRIPTION	ESTIMATED PLAN QUANTITY	UNIT BID PRICE	UNITS OF WORK		TOTAL COST OF COMPLETED WORK	% OF EST. QUAN. COMP.
				COMPLETED THIS REQUEST	COMPLETED TO DATE		
1.	TRAFFIC CONTROL	1 LS	9,014.00	1.0	1.0	9,014.00	100.00
2.	BOREHOLE DRILLING/ REAMING	380 LF	21.13	636.0	636.0	13,438.68	167.37
3.	UNDERGROUND MINE STOWING	275 CY	21.32	398	398	8,475.13	144.55
4.	BACKFILL BOREHOLES CONCRETE/GROUT	19 CY	67.00	16.99	16.99	1,138.33	89.42
5.	BACKFILL BOREHOLES AGGREGATE BASE & ASPHALTIC CONCRETE	2 CY	147.00	2	2	294.00	100.00
6.	SUBSIDENCE BACKFILL	1 LS	2,955.00	1	1	2,955.00	100.00
7.	FERTILIZE, SEED & MULCH	1 LS	1037.00	0.50	0.50	518.50	50.00
SUBTOTAL							\$35,833.64

ADDITIONAL COST FOR UNUSED STOWAGE

18.05 CY @ \$8.31 = \$150.00

PAY PERIOD TOTAL \$35,983.64

FINAL PAY REQUEST

FROM: October 25, 1990

TO: October 25, 1990

PROJECT NAME: Bearcreek Highway Project

LOCATION: Carbon County, Montana

PROJECT NO: DSL/AMRB 90-001

NAME OF CONTRACTOR: McDaniel & Sons
Contractors

ADDRESS: P.O. Box 6716
Neihart, MT 59465

SUMMARY OF PROJECT STATUS

Amount of Original Contract	28,465.40
Amount of Approved Change Order(s)	8,036.74
TOTAL CONTRACT AMOUNT	36,502.14
Contract Time Used to Date	23 days
Percentage of Contract Time Used	38 %
Percentage of Contract Amount Earned	128.2 %

Original Contract Amount Completed	\$ 28,465.40
Change Order(s) Amount Completed	8,036.74
TOTAL AMOUNT Earned To Date	36,502.14
Less Previous Amount Earned	34,186.46
Amount Payable This Period	2,317.68
Less 1% Gross Receipts Tax	23.18
TOTAL DUE CONTRACTOR THIS PERIOD	2,294.50

Requested By:

McDaniel & Sons *John McDaniel* Date: 12/3/90
Contractors (Contractor)

Checked By:

Chen-Northern, Inc. *Terence B. Bowser* Date: 11/28/90
(Engineer)

Approved By:

SM
Department of State Lands *Zane Marshall* Date: 12/6/90
Abandoned Mine Reclamation Bureau (Owner)

ITEMIZATION OF QUANTITIES AND COSTS

ITEM NO.	DESCRIPTION	ESTIMATED PLAN QUANTITY	UNIT BID PRICE	UNITS OF WORK COMPLETED THIS REQUEST	UNITS OF WORK COMPLETED TO DATE	TOTAL COST OF COMPLETED WORK	% OF ESTIMATED QUANTITY
1	Traffic Control	1 LS	9,014.00	1.00	1.00	9,014.00	100.00
2	Borehole Drilling/ Reaming	380 LF	21.13	636.00	636.00	13,438.68	167.37
3	Underground Mine Stowing	275 CY	21.32	397.52	397.52	8,475.13	144.55
4	Backfill Boreholes Concrete/Grout	19 CY	67.00	16.99	16.99	1,138.33	89.42
5	Backfill Boreholes, Aggregate Base & Asphaltic Concrete	2 CY	147.00	2.00	2.00	294.00	100.00
6	Subsidence Backfill	1 LS	2,955.00	1.00	1.00	2,955.00	100.00
7	Fertilize, Seed & Mulch	1 LS	1,037.00	1.00	1.00	1,037.00	100.00
SUBTOTAL							<u>36,352.14</u>
Additional Cost For Unused Stowage: 18.05 CY @ \$8.31/CY							150.00
Minus Previous Payments							<u>-34,184.46</u>
PAY PERIOD TOTAL							2,317.68

STATE OF MONTANA
DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

Name of Project Bearcreek Highway Project DSL-AMRB-90-001

Contractor McDaniel & Sons Contractors

SCHEDULE OF VALUES FOR CONTRACT PAYMENT

Description of Items	Quantity	Unit of Measure	Labor Costs	Material Costs	Other Costs	Total Cost of Item	Cost Per Unit
Traffic Control	1	LS	3,590.38	1,825.00	3,593.62	9,014.00	9,014.00
Borehole Drilling/Reaming	380	LF	134.41	1,772.70	6,122.29	8,029.40	21.13
Underground Mine Stowing	275	CY	1,633.51	1,615.00	2,614.49	5,863.00	21.32
Borehole Backfill, Concrete or Grout	19	CY	0.00	1,092.50	180.50	1,273.00	67.00
Borehole Backfill, Aggreg. Base & Asphaltic Concrete	2	CY	160.57	60.00	73.43	294.00	147.00
Subsidence Backfill	1	LS	1,616.64	0.00	1,338.36	2,955.00	2,955.00
Fertilize, Seed, and Mulch	1	LS	341.30	412.50	283.20	1,037.00	1,037.00
			7,476.81	6,777.70	14,210.89	28,465.40	

I hereby certify that the costs of the work items noted above include an appropriate amount of overhead and profit applicable to each work item.

Signed by McDaniel Date May 16, 1990
(Contractor)

Checked by Mark D. B. Date 6 June 1990
(Engineer)

Approved by _____ Date _____
(Owner)

SECTION II

2.13 AFFIDAVIT ON BEHALF OF CONTRACTOR

STATE OF Montana

DSL-AMRB-90-001

COUNTY OF Cascade

DATE November 7, 1990

I certify to the best of my knowledge and belief that all work has been performed and materials supplied in strict conformance with the terms and conditions of the corresponding contract documents between Department of State Lands AMRB, the Owner, and McDaniel & Sons Contractors, the Contractor, dated May 25, 1990 for the Bearcreek Highway Project

DSL-AMRB-90-001

(Project)

and further declare that all bills for materials, supplies, utilities, and for all other things furnished or caused to be furnished by the above-named Contractor and used in the execution of the above Contract have been fully paid, and there are no unpaid claims or demands of State Agencies, subcontractors, materialmen, mechanics, laborers or any others resulting from or arising out of work done or ordered to be done by said Contractor under the above-identified Contract.

In consideration of the prior and final payments made and all payments made for authorized changes, the Contractor releases and forever discharges the Owner from any and all obligations and liabilities arising by virtue of said Contract and authorized changes between the parties hereto, either verbal or in writing, and any and all claims and demands of every kind and character whatsoever against the Owner, arising out of or in any way relating to said Contract, and authorized changes..

This statement is made for the purpose of inducing the Owner to make Final Payment under the terms of the Contract, relying on the truth and statements contained therein.

Dated this 7th day of November, 1990, at Great Falls, Montana.

CONTRACTOR: McDaniel & Sons Contractors

By

Subscribed and sworn to before me this 7th day of November, 1990.

Notary Public for the State of Montana

Residing at Great Falls

My commission expires 4-19-93

NOTARY PUBLIC for the State of Montana

Residing at Great Falls, Montana

1 - My Commission Expires April 19, 1993 REV. 4/88

SECTION II

APPENDIX E

PROJECT SLIDES AND PHOTOGRAPHS

